

3.16 Energy

3.16.1 Regulatory Setting

The National Environmental Policy Act (NEPA) (42 United States Code [USC] Part 4332) requires the identification of all potentially significant impacts to the environment, including energy impacts.

The California Environmental Quality Act (CEQA) Guidelines, Appendix F, Energy Conservation, state that EIRs are required to include a discussion of the potential energy impacts of proposed projects, with particular emphasis on avoiding or reducing inefficient, wasteful and unnecessary consumption of energy.

3.16.2 Affected Environment

Driven by high demand from California's many motorists, major airports, and military bases, the transportation sector is the state's largest energy-consumer. Roughly half of the energy that Californians consume is for transportation. More motor vehicles are registered in California than in any other state, and worker commute times are among the longest in the country. In 2009, Californians consumed an estimated 657.2 million barrels of gasoline and diesel fuel, approximately 9.6 percent of the national total. In 2008, Californians had 117,000 alternatively-fueled vehicles in use, approximately 15.1 percent of the national total.¹

Transportation-related consumptive uses of energy in the Southern California Association of Governments (SCAG) region are summarized in Table 3.16.A for the years indicated. These data are the most recent available in each case and are, therefore, the most representative of current conditions.

Nonrenewable energy products derived from crude oil (e.g., gasoline, diesel, kerosene, and residual fuel) provide most of the energy consumed for transportation purposes by on-road motor vehicles (i.e., automobiles and trucks), locomotives, aircraft, and ships. In addition, energy is consumed in connection with construction and maintenance of transportation infrastructure, such as streets, highways, freeways, locomotives, and airport runways. Trends in transportation-related technology foretell increased use of electricity and natural gas in transportation vehicles.

¹ U.S. Energy Information Administration, State/Territory Energy Profiles website: <http://www.eia.gov/state/state-energy-profiles.cfm?sid=CA>, accessed August 24, 2011.

Table 3.16.A Annual Transportation Energy Consumption in the SCAG Region

| Category | Fuel Type | Year | Consumption |
|--------------------------|--|------|------------------------------------|
| Motor Vehicles | Gasoline/Diesel ¹ | 2005 | 8,524,639 thousand gallons (SCAG) |
| | Natural Gas (Compressed and Liquefied) ² | 2004 | 22,630 million cubic feet (CA) |
| | Hydrogen ³ | 2006 | 0.02 million kilograms (CA) |
| | Ethanol ⁴ | 2006 | 23 million barrels (CA) |
| Aircraft | Aviation Gasoline, Kerosene-type Jet Fuel ⁵ | 2006 | 14,599,670 thousand gallons (SCAG) |
| Locomotives | Distillate Fuel Oil ⁶ | 2005 | 324,496 thousand gallons (CA) |
| Ships (Vessel Bunkering) | Residual and Distillate Fuel Oil ⁷ | 2005 | 677,649 thousand gallons (CA) |

Source: SCAG 2008 RTP PEIR.

Note: California's transportation sector is more than 95 percent dependent on petroleum. Therefore, additional alternative fuels are not shown in this table.

¹ Source: California Department of Transportation, Division of Transportation System Information. (December 2006). California Motor Vehicle Stock, Travel and Fuel Forecast.

² Source : California Energy Commission, Natural Gas Statistics. Retrieved September 27, 2007, from http://www.energy.ca.gov/naturalgas/natural_gas_facts.html. and United States Department of Energy Alternative Fuels and Advanced Vehicles Data Center, Energy Efficiency and Renewable Energy, Estimated Consumption of Alternative Fuel by AFVs (in thousand GGEs), http://www.eere.energy.gov/afdc/data/docs/alternative_fuel_consumption.xls.

³ Source: South Coast Air Quality Management District, 2007 Final Program Environmental Impact Report for the Air Quality Management Plan, Energy Chapter, Retrieved October 5, 2007, from http://www.aqmd.gov/ceqa/documents/2007/aqmd/finalEA/07aqmp/ch4.2_FPEIR.pdf.

⁴ California Energy Commission, 2007 Integrated Energy Policy Report Staff Draft. (October 2007). Retrieved on October 5, 2007, from <http://energy.ca.gov/2007publications/CEC-100-2007-008/CEC-100-2007-008-CTD.PDF>.

⁵ United States Department of Energy, Table 5.13c Estimated Petroleum Consumption: Transportation Sector, 1949-2006. Retrieved October 5, 2007 from <http://www.eia.doe.gov/emeu/aer/txt/ptb0513c.html>; Source" Federal Aviation Administration, Passenger Boarding and All Cargo Data for U.S. Airports 2006. Retrieved November 2, 2007, from http://www.faa.gov/airports_airtraffic/airports/planning_capacity/passenger_allcargo_stats/passenger/index.cfm?year=2006.

⁶ United States Department of Energy, Energy Information Administration. Table 13: Adjusted sales of distillate fuel oil by energy use in the United States: 2001-2005. Retrieved September 27, 2007, from 2005.

⁷ United States Department of Energy, Energy Information Administration. Table 13: Adjusted sales of distillate fuel oil by energy use in the United States: 2001-2005. Retrieved September 27, 2007, from http://www.eia.doe.gov/pub/oil_gas/petroleum/data_publications/fuel_oil_and_kerosene_sales/current/pdf/table23.pdf.

CA = California

PEIR = Programmatic Environmental Impact Report

RTP = Regional Transportation Plan

SCAG = Southern California Association of Governments

Transportation energy is derived from a wide variety of petroleum products. Automobiles and trucks consume gasoline and diesel fuel. The transportation sector consumes relatively minor amounts of natural gas or electricity but, propelled mainly by air quality laws and regulations, technological innovations in transportation are expected to increasingly rely on compressed natural gas and electricity as energy sources. Biodiesel, which is derived from plant sources such as used vegetable oils, is a small but growing source of transportation fuel. Vehicles powered by fuels other than gasoline or diesel are referred to as "alternative fuel vehicles."

Energy consumption by on-road motor vehicles reflects the types and numbers of vehicles, the extent of their use (typically described in terms of vehicle miles traveled), and their fuel economy (typically described in terms of miles per gallon). Trends in energy consumption by on-road motor vehicles generally follow trends in population and per capita income as well as trends in land use development patterns. For example, diffuse land use development patterns can result in an imbalance between jobs and housing, which can result in longer average commute trips.

3.16.3 Environmental Consequences

3.16.3.1 Methodology

This energy analysis is based on the methodology described in detail in the Caltrans Standard Environmental Reference (SER), Volume 1, Chapter 13 – Energy (updated February 3, 2012). The energy analysis addresses two elements: direct and indirect energy consumption. Direct energy refers to the fuel consumed by vehicles using a highway facility. Indirect energy refers to energy associated with the construction and operation of a highway facility.

Direct transportation energy consumption was estimated for the project using traffic data and the EMFAC2007 air quality model, which provides estimated gasoline and diesel fuel consumption rates. Estimated energy consumption in 2040 is expected to represent the most conservative (i.e., highest) energy consumption, because population and employment are projected to be higher in that year than in any earlier year. In addition, the analysis does not reflect the impact of energy efficiency and conservation measures that are likely to be adopted by 2040 and which would result in lower energy consumption than projected in these estimates (i.e., new California Environmental Protection Agency [CalEPA]/EPA fuel economy standards, bus rapid transit, and high-occupancy vehicles [HOVs]).

Implementation of the MCP project would affect the use of energy resources in the Riverside County region. The analysis of these impacts is at the regional level and is, therefore, by its nature an analysis of cumulative impacts. Three main areas of impact have been identified: (1) energy demands for construction; (2) energy demands for operation of the regional transportation system as of 2040; and (3) the cumulative impacts of the growing energy demand associated with implementation of the MCP project.

3.16.3.2 Permanent Direct Impacts

Build Alternatives

Local energy demand for transportation projects typically is dominated by vehicle fuel usage. Lighting will be provided at the system and service interchanges, at exit and entrance ramps, and at island noses. However, there will be no lighting on the mainline MCP facility. As a result, for this type of project, it is assumed that the energy consumption by vehicles is much larger than the incremental change in electrical energy consumption for any additional lighting (i.e., roadway lighting), which is expected to be minimal. Therefore, energy used from lighting would not have an impact on the environment.

As shown in the air quality and traffic analyses of this EIR/EIS (Sections 3.14 and 3.6, respectively), construction of any of the MCP Build Alternatives would alter the traffic flow within the MCP study area. Based on the traffic analysis, the project would increase the vehicle miles traveled (VMT) within the MCP study area, but would improve the traffic flow by increasing the average vehicle speed resulting in lower vehicle hours traveled (VHT). The enhanced traffic flow conditions would minimize vehicle delay and improve vehicle fuel efficiency. Table 3.16.B lists the fuel consumption and fuel costs associated with the vehicle trips for each MCP Build Alternative within the MCP study area.

Table 3.16.B MCP Study Area Daily Fuel Consumption Comparison

| Alternative | VMT | VHT | Average Speed | Fuel Consumption (gallons) | Fuel Cost ¹ | Percent Increase from No Build |
|-----------------------------|-------------|-----------|---------------|----------------------------|------------------------|--------------------------------|
| Existing | 58,587,722 | 1,453,129 | 40.32 | 3,216,600 | \$12,121,000 | N/A |
| 2020 No Build | 88,182,658 | 2,542,937 | 34.68 | 5,046,900 | \$19,036,000 | N/A |
| 2020 Alternative 4 Modified | 88,330,571 | 2,535,290 | 34.84 | 5,082,600 | \$19,170,000 | 0.71% |
| 2020 Alternative 5 Modified | 88,311,054 | 2,543,194 | 34.72 | 5,081,500 | \$19,166,000 | 0.69% |
| 2020 Alternative 9 Modified | 88,323,019 | 2,547,245 | 34.67 | 5,082,200 | \$19,169,000 | 0.70% |
| 2040 No Build | 124,602,999 | 3,411,233 | 36.53 | 7,263,200 | \$27,418,000 | N/A |
| 2040 Alternative 4 Modified | 124,965,085 | 3,427,652 | 36.46 | 7,284,300 | \$27,497,000 | 0.29% |
| 2040 Alternative 5 Modified | 124,957,372 | 3,420,891 | 36.53 | 7,283,800 | \$27,496,000 | 0.28% |
| 2040 Alternative 9 Modified | 125,046,046 | 3,407,562 | 36.70 | 7,289,000 | \$27,515,000 | 0.36% |

Source: VRPA and LSA Associates, Inc. (2011).

¹ Fuel cost was calculated using a gasoline cost of \$3.75 per gallon and diesel cost of \$3.91 per gallon. Data from the U.S. Energy Information Administration. (http://www.eia.gov/oil_gas/petroleum/data_publications/wrgp/mogas_home_page.html), accessed October 25, 2011.

MCP = Mid County Parkway

N/A = Not Applicable

VMT = Vehicle Miles Traveled

VHT = Vehicle Hours Traveled

As shown in Table 3.16.B, implementation of the MCP project alternatives would result in a slight increase in fuel consumption in 2020 (i.e., up to a 0.71 percent increase) within the MCP study area. However, by 2040, the differences decrease to 0.36 percent or less. Therefore, implementation of any of the MCP Build Alternatives would not result in a substantial increase in fuel consumption.

No Build Alternative

Under the MCP No Build Alternatives, the permanent effects on energy consumption discussed above for the MCP Build Alternatives would not occur for the MCP project itself, but these permanent energy consumption effects would occur for the other transportation improvement projects included in the No Build Alternatives.

3.16.3.3 Permanent Indirect Impacts

Build Alternatives

Indirect manufacturing energy effects involve the one-time, nonrecoverable energy costs associated with the manufacture of vehicles. Indirect maintenance energy effects involve the ongoing, nonrecoverable energy costs associated with the maintenance of vehicles. This analysis was conducted using the Input-Output Method. This method converts either VMT or construction costs into energy consumption based on existing data from other road improvement projects in the United States using conversions listed in the Caltrans Energy and Transportation Systems handbook (July 1983). It was assumed that the energy requirements for manufacturing and maintaining vehicles have not changed from those listed in the handbook. Thus, the per-vehicle indirect energy impacts for the MCP Build Alternatives would be the same and would not change from the existing condition.

The Build Alternatives would alter the traffic flow in the MCP study area. The traffic analysis for the project study area shows that the road improvements would enhance the traffic flow, resulting in an increase of both the average vehicle speeds and the VMT. This is due to enhanced traffic flow conditions, minimizing vehicle delay, and improving vehicle fuel efficiency. Using the estimated VMT and VHT data shown in Table 3.16.B, Table 3.16.C shows that the Build Alternatives would result in a slight increase in indirect energy consumption (i.e., up to a 0.43 percent increase) in the project study area compared to the No Build Alternative; however, this increase is minimal and does not offset indirect energy use.

Table 3.16.C MCP Study Area Indirect Energy Comparison

| Description | Energy Used (Billion BTU/day) | | | |
|-------------------------------------|-------------------------------|------------------------|------------------------|------------------------|
| | No Build | Alternative 4 Modified | Alternative 5 Modified | Alternative 9 Modified |
| Manufacturing | | | | |
| Auto Manufacture | 117 | 117 | 117 | 117 |
| Truck Manufacture | 6.81 | 6.82 | 6.82 | 6.82 |
| Subtotal | 124 | 124 | 124 | 124 |
| Maintenance | | | | |
| Auto Maintenance | 94.6 | 94.7 | 94.7 | 94.7 |
| Truck Maintenance | 12.8 | 12.8 | 12.8 | 12.8 |
| Subtotal | 107 | 108 | 108 | 108 |
| TOTAL | 231 | 232 | 232 | 232 |
| Percent Change from No Build | N/A | 0.43% | 0.43% | 0.43% |

Source: LSA Associates, Inc. (2012).

BTU = British thermal units

MCP = Mid County Parkway Project

N/A = not applicable

3.16.3.4 California Energy Action Plan

The California Energy Commission, the California Public Utilities Commission (CPUC), and the Consumer Power and Conservation Financing Authority (called the CPA, which is now defunct) approved the final State of California Energy Action Plan in 2003, which was proposed by a subcommittee of these three agencies. The Plan established shared goals and specific actions to ensure that adequate, reliable, and reasonably priced electrical power and natural gas supplies are achieved and provided through policies, strategies, and actions that are cost-effective and environmentally sound for California's consumers and taxpayers. In 2005, an updated Energy Action Plan was adopted by the California Energy Commission and CPUC to reflect policy changes and actions after 2003.

The State of California's energy policies have been substantially influenced by the passage of Assembly Bill 32, the California Global Warming Solutions Act of 2006. The California Energy Commission's *2007 Integrated Energy Policy Report* advanced policies that would enable the state to meet its energy needs in a carbon-constrained world. That report also provides a comprehensive set of recommended actions to achieve these policies.

Rather than produce a new Energy Action Plan, the California Energy Commission and the CPUC have prepared instead the Energy Action Plan – 2008 Update that examines the state's ongoing actions in the context of global climate change. The update was prepared using the information and analysis prepared for the recent *2007 Integrated Energy Policy Report*, as well as recent CPUC decisions.

3.16.4 Temporary Impacts

Build Alternatives

Indirect construction energy effects involve the one-time, nonrecoverable energy costs associated with construction of roads, structures, and vehicles. The indirect energy analysis for the project was also conducted using the Input-Output Method. It was assumed that the energy required to manufacture a vehicle has not changed since the handbook was published in July 1983. However, an adjustment of the energy cost per British thermal unit¹ (BTU) was made by using a Highway Construction Price Index factor of 2.0.

Based on the estimated costs to construct the Build Alternatives (refer to the Draft Project Report [August 2011]), it would take approximately 11.4 trillion BTUs to construct the 2020 Alternative 4 Modified, 11.1 trillion BTUs to construct Alternative 5 Modified, and 10.0 trillion BTUs to construct Alternative 9 Modified. As described in detail in Section 3.16.3.2, Permanent Direct Impacts, there are effectively no direct energy savings with either Build Alternative compared to the No Build Alternative, so the payback period for these construction costs is not quantifiable. However, similar to other recently completed major construction projects in southern California, because the increased energy demands of construction of the MCP project are such a small fraction of the regional energy consumption, the construction of either Build Alternative is unlikely to create a noticeable impact related to short-term demand for energy during project construction.

No Build Alternative

Under the MCP No Build Alternatives, the temporary energy consumption discussed above for the MCP Build Alternatives would not occur, but temporary energy consumption would occur for the other transportation improvement projects included in the No Build Alternatives. Generally, construction energy can be compared to increased roadway maintenance energy if a project is not built. However, there is insufficient information to quantify this energy savings.

3.16.5 Global Climate Change

The project impacts to global climate change are discussed in Section 4.5, Climate Change.

¹ BTU is the quantity of energy necessary to raise the temperature of 1 pound of water 1 degree Fahrenheit (°F) at 1 atmosphere of pressure.

3.16.6 Avoidance, Minimization, and/or Mitigation Measures

The MCP project would result in a nominal (maximum of 0.36 percent) long-term increase in regional energy consumption compared to the No Build Alternatives due to project operation as a result of increased VMT. Mitigation Measures AQ-1 through AQ-5, discussed in Section 3.14, will reduce impacts related to increased energy consumption and global climate change.